



**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 15739PCT00	<b>FOR FURTHER ACTION</b>  See Form PCT/PEA/416																	
International application No. PCT/DK2005/000090	International filing date (day/month/year) 10.02.2005	Priority date (day/month/year) 10.02.2004																
International Patent Classification (IPC) or national classification and IPC INV. H04L9/32																		
Applicant CRYPTICO AS et al.																		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 6 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																		
<p>4. This report contains indications relating to the following items:</p> <table style="width: 100%; border: none;"><tr><td style="width: 10%;"><input checked="" type="checkbox"/> Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/> Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/> Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input checked="" type="checkbox"/> Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/> Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/> Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input checked="" type="checkbox"/> Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/> Box No. VIII</td><td>Certain observations on the international application</td></tr></table>			<input checked="" type="checkbox"/> Box No. I	Basis of the report	<input type="checkbox"/> Box No. II	Priority	<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input checked="" type="checkbox"/> Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/> Box No. VI	Certain documents cited	<input checked="" type="checkbox"/> Box No. VII	Certain defects in the international application	<input type="checkbox"/> Box No. VIII	Certain observations on the international application
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Date of submission of the demand  15.09.2005	Date of completion of this report  12.06.2006																	
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  Holper, G  Telephone No. +31 70 340-2304  																	

**INTERNATIONAL PRELIMINARY REPORT  
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**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4(a))
  - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements\*** of the international application, this report is based on *{replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report}*:

**Description, Pages**

1-13 as originally filed

**Claims, Numbers**

1-47 received on 19.05.2006 with letter of 16.05.2006

**Drawings, Sheets**

15-55 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. IV Lack of unity of invention**

1. ☐ In response to the invitation to restrict or pay additional fees, the applicant has, within the applicable time limit:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest and, where applicable, the protest fee.
  - ☐ paid additional fees under protest but the applicable protest fee was not paid.
  - ☐ neither restricted the claims nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
- ☐ complied with.
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos. .

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-47
	No: Claims	
Inventive step (IS)	Yes: Claims	1-47
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-47
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

10/588772

IAP11 Rec'd PCT/PTO 08 AUG 2006

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**Re Item IV**

This Authority considers that there are three inventions covered by the claims indicated as follows:

I: Claims 1-20 are directed to a method for generating an identification value for identifying an electronic message in a MAC in which data representing the length  $L$  of the message are concatenated to the output or to an intermediate result.

II: Claims 21-40 are directed to a method for generating an identification value for identifying an electronic message in a MAC in which an auxiliary hash function having a different compression rate is applied to an unprocessed data block if  $n$  does not divide the number  $m_i$  of input blocks.

III: Claims 41-47 directed to method for generating an identification value for identifying an electronic message using a delta-universal hash function and a sum of the resulting number and a further block of data.

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

Although the problems dealt with by the independent claims 1, 21 and 41 are linked or identical, the solutions defining the special technical features are not the same nor corresponding, contrary to Rule 13.2 PCT (see point V below).

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following document:

D1: MATSUO T ET AL: "ON PARALLEL HASH FUNCTIONS BASED ON BLOCK-CIPHERS" IEICE TRANSACTIONS ON FUNDAMENTALS OF ELECTRONICS, COMMUNICATIONS AND COMPUTER SCIENCES, INSTITUTE OF ELECTRONICS INFORMATION AND COMM. ENG. TOKYO, JP, vol. E87-A, no. 1, January 2004 (2004-01), pages 67-74, XP001185960 ISSN: 0916-8508

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The application concerns three methods (claims 1, 21 and 41) for generating an identification value for identifying an electronic message, three computer systems (claims 19, 39, 46) programmed to carry out said methods as well as computer program products (claims 20, 40, 47) for performing said methods.

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and shows (the references in parentheses applying to this document, see fig.3):

a method for generating an identification value based on parallel hash functions applied in a tree structure (three rounds) where a residual data block ( $m_5$ ) is passed without compression from the current level to another subsequent level (3rd level) in case  $n$  does not divide the number  $m_i$  of input blocks for said current level.

The subject-matter of claim 1 differs from this known method in that data which represent the length  $L$  of the message are concatenated to the output or one of the intermediate results.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to avoid an intentional modification of the input message length which could not be detected by the known method.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Appending data representing the length  $L$  of the input message during consecutive hashing is not known nor suggested by the prior art.

Concerning method claim 21, the closest prior art is also illustrated by D1.

The problem to be solved by method claim 21 is to find an alternative solution for avoiding the padding of zero blocks in the Damgard construction and thus to reduce the total number of hash functions.

According to claim 21 this problem is solved by using an auxiliary hash function having a compression rate which is different from the compression rate of a first hash function.

Using different compression rates during the generation of a MAC is not known nor



suggested in the prior art.

Claims 2-18 are dependent on claim 1 and claims 22-38 are dependent on claim 21; as such they also meet the requirements of the PCT with respect to novelty and inventive step.

Concerning method claim 41 the closest prior art is again illustrated by D1.

The problem to be solved is again to find an alternative for reducing the number of hash functions used during compression as compared to the Damgard construction.

According to claim 41 this problem is solved by computing the sum of the result of a delta-hash function and a further block which is not hashed. This processing step is not known nor suggested by the prior art.

Claim 42-45 are dependent on claim 41 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claims 19 and 20, 39 and 40, 46 and 47 define computer systems and computer program products carrying out the methods of claims 1, 21 and 41 respectively. As such they also meet the requirements of the PCT with respect to novelty and inventive step.

#### **Re Item VII**

Independent claim 1 is not in the correct two-part form in accordance with Rule 6.3(b) PCT, which in the present case is appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

In the present case, the following features are known in combination from the document D1 and belong in the preamble of such a claim:

a residual data block is passed without compression from the current level to another subsequent level in case  $n$  does not divide the number of input blocks  $m_i$  for said current level.

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The features of the independent method claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).